FJVPS Deployment Case Study

FUJITSU

Murata Machinery Ltd.

Concurrent Engineering:

Delivering Better Products, Faster

- Prototype assembly time reduced to half & shortened development lead time by 8 months -

(Hereafter: Murata Machinery)・Inuyama Works, is liable for development, manufacture and sales of various machining tools, logistics systems such as automated warehouses, clean FA, etc. The workplace, which has been promoting effective use of 3D design data across departments for some time, is now using VPS to strengthen its strategy. Promoting concurrent engineering in new model development and realizing front-loading by absorbing knowledge and insights from initial design stage to next process (production engineering, manufacturing, machining, construction and service). Simultaneously, company is strengthening its manufacturing system by 3D digitization of assembly procedures and standard work time management, resulting in significant improvements in QCD.

Deployment case study key word

Design Product	Logistics system, FA system, Clean FA, Machining Tool, Metal Sheet Processing Machine, Textile Machine, Information Equipment	
Solution	Fujitsu's Manufacturing Solutions	Manufacturing Solutions Page
Product	FJVPS, FJGP4D	Product's page

Pursuing QCD through Concurrent Engineering

Mr. Noboru Okayama

Manufacturing Division
Section head, Production Engineering Department

The Murata Machinery・Inuyama Factoy has long adopted a system to identify problems during the development of new models and provide feedback to the design department. However, there was a problem that as long as the company waited for the prototyping process, it was late to point out the problem to the design department, and the response to the point out tended to be insufficient. From the perspective of total optimization, Mr. Noboru Okayama, a section chief of the Production Engineering Department of the Manufacturing Division, is working to develop and realize the ideal state of manufacturing across divisions.

"80% of the product cost is determined during the design phase. In other words, it's up to the exit. Therefore, we simulated process design and assembly verification, and we aimed to create 3D assembly procedures and increase the target time in the assembly process, along with vertical start-up by front-loading production preparation."

While focusing on quality, which is the basis of manufacturing, we nip problems in the bud early in the design process and eliminate unnecessary rework. In addition, the strategic aim was to achieve an advantage in terms of delivery time by pursuing cost reduction, the source of competitiveness and profitability, and reducing development lead time.

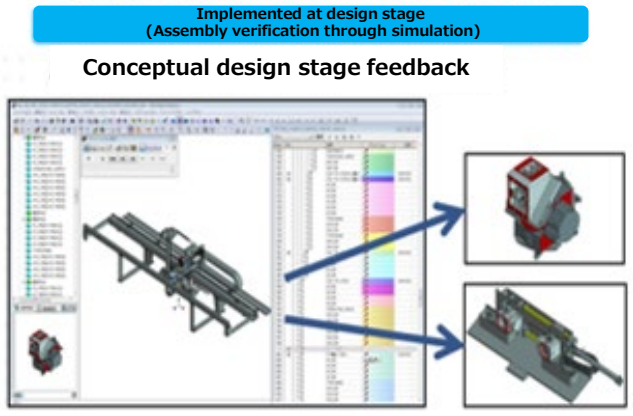
VPS is selected as process design/verification tool, and design accuracy improvement is accelerated through observations basis of on-site perspective

Immediately, the selection of a platform for this purpose began. "Initially, we considered using a 3D-CAD add-on tool, but we wanted to achieve even higher performance, so we listed multiple candidates. The overall point and the fact that we already have a similar track record of use in the field of information equipment. In addition, we took into account the total responsiveness of a solution from Japan that quickly responds to function additions and improvement proposals, and finally selected VPS."

In this way, a system has been realized that visually creates the assembly process from the early stages of development based on 3D-CAD data. Until now, it has become possible to absorb points from the perspective of post-processing, which were only possible at the prototype stage after the product was released, at the conceptual design and detailed design stages.

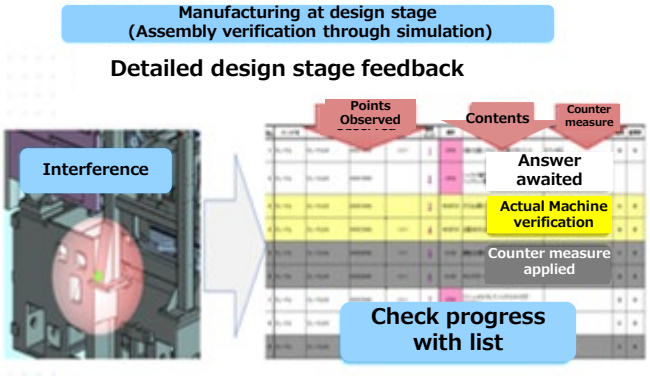
In fact, we do not point out details at the conceptual design stage but design a rough process such as the flow of assembly and the mass of sub-assemblies and point out the contents related to the general framework of assembly, such as the division position of parts. In response to these suggestions, the detailed design stage is further elaborated, and the process design up to the detailed assembly order is shown, and interference during assembly and actual workability and assembling are verified. Since the VPS data including the manufacturing information created here can also be diverted to the creation of forms such as procedure manuals, it is possible to realize a mechanism for efficiently creating multiple outputs from a single VPS data. In addition, we are also taking trial an initiative to replace the easy-to-understand VPS data including this manufacturing information with the formulation.

- Use of 3D data in development process (1)



Conceptual design stage carries out rough assembly process design, including assembly flow and sub-assemblies ⇒
Check dividing positions of parts, wiring routes, relay positions, etc.

- Use of 3D data in development process (2)



Process design from Detailed design stage to detailed assembly sequence ⇒ Check interference, machining, assembly, etc.

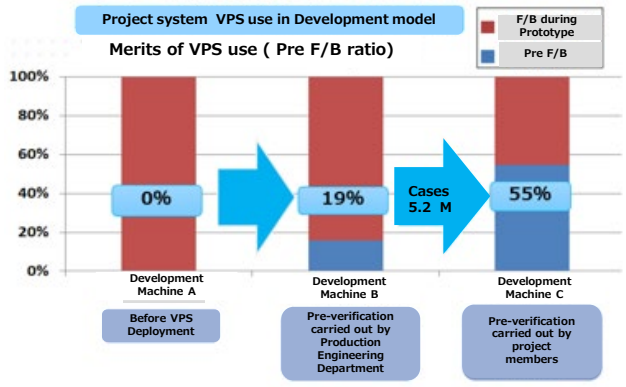
Based on these achievements in assembly verification, we have further expanded the number of evaluators who have pointed out in advance from the production engineering department and personnel involved in the assembly process to promote front-loading. A study project team was formed that brought together young key people involved in all processes, including post-production processes, such as electricity and control, construction and service, and procurement.

The figure below compares the percentage of feedback on design and manufacturing issues in advance (before prototype creation) when "prior verification by the VPS introduction", "preliminary verification only by the production engineering department", and "preliminary verification by the project team" was performed for similar models. We were able to raise the feedback of 0% before the introduction of VPS, 19% of the pre-verification by the production engineering department alone, and 55% of the pre-verification by the project members at the stage before actually making the product.

Mr. Okayama points out that the key to the establishment of pre-verification is that the growing awareness of front-loading in the development models of the business division and the efforts to utilize 3D data cultivated by production technology are matched.

Thanks to this team, we are able to refine product from perspective of entire product lifecycle, and development attitude from perspective of customer who uses product every day after delivery it was further accelerated.

● Effects of VPS use (1)



Efficient production system is accelerated by setting standard work hours

As the second step, aiming for a vertical start-up, the Production Engineering Department worked on standard time calculation and assembly procedure manual creation using VPS.

For standard work time calculation, by porting the work time calculation database (Excel), which had been created independently, to the VPS database, we built a system to calculate the time while checking the VPS 3D anime and procedures. However, the input of parameters required for time calculation (e.g., by hand, by crane) must be done manually, and further efficiency has been an issue.

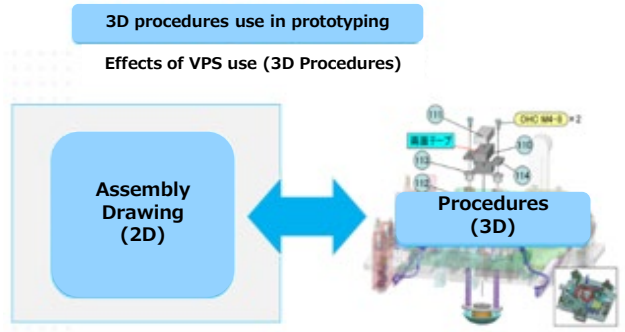
Therefore, by utilizing 3D attributes (weight, part names, etc.) and shape data, we thoroughly examined whether it is possible to automatically input parameters. We have achieved aut omation of 45% of the parameter input work, and we are promoting further automation.

Challenge of converting assembly procedure manuals to 3D and demonstrating reliable effects

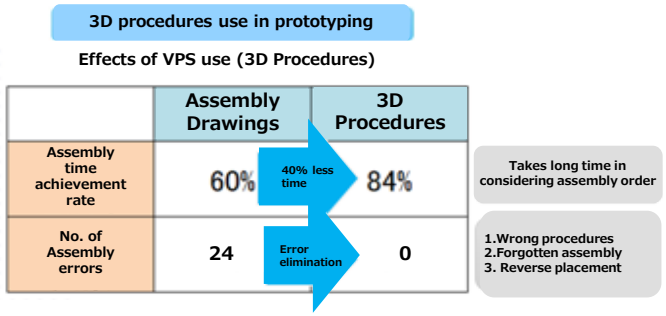
Based on the 3D-CAD data, the assembly procedure manual is converted to 3D using VPS. Through this process, the basic rules for creating the procedure manual were established, such as "constructing a screen with approximately 3~5 parts in one shot in consideration of the ease of viewing by the operator" and "setting the angle with the orientation and operator in mind when actually assembling the screen."

In addition, in order to quantify the effect of the 3D procedure manual, we conducted a comparative verification between "assembly with conventional assembly drawings" and "assembly with 3D procedure manuals". As a result, the assembly time achievement rate increased from 60% to 84%. Thanks to elimination of procedural mistakes, forgetting to assemble, and reverse placement, there were 24 times in assembly diagram Assembly errors were also reduced to zero.

● Effects of VPS use (2)



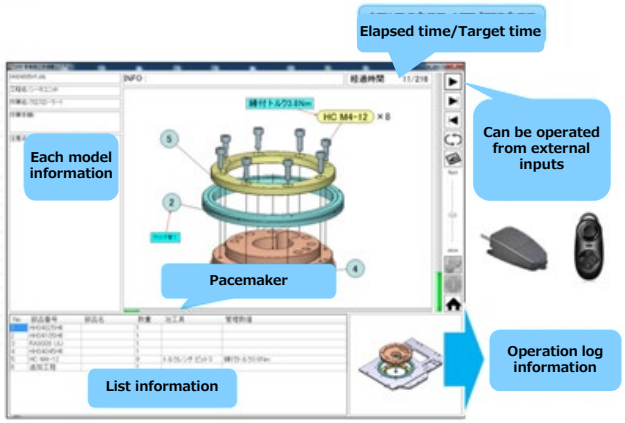
Comparison between conventional assembly drawing and assembly using pre-prepared 3D procedures



Assembly time reduction through 3D procedures
Errors due to misreading of assembly drawings are also reduced

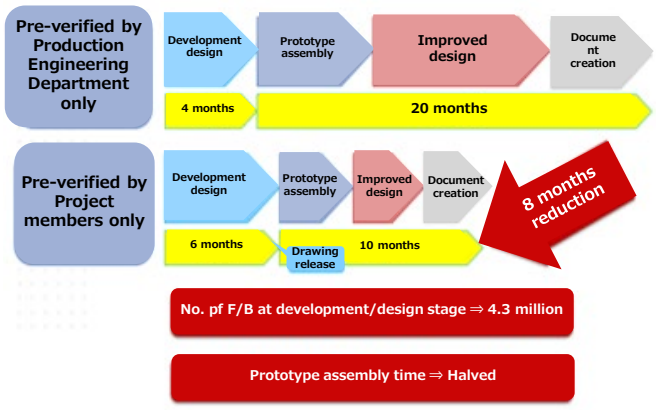
In addition, with aim of expanding use of 3D procedure manuals from prototyping to mass production, we have introduced VPS Manufacturing Instruction Viewer. VPS Manufacturing Instructions Viewer for VPS 3D Anime The screen is centered, and various information is displayed on same screen. Along with a pacemaker based on standard working hours, target time and current elapsed time are presented, so that operator can check work level on his or her own. In addition, by analysing and improving work from operation log information, it is a system that can be expected to further improve work accuracy

Manufacturing Instructions Viewer Deployment



As a result of the various efforts introduced above, the amount of feedback at the development stage has increased by 4.3 times, and the prototype assembly time has been halved. In addition, the development lead time after the introduction of VPS was 4 months for development design and 20 months for prototype assembly A ~ improvement design ~ document creation when verified only by the Production Engineering Department, but the shortening was accelerated with the participation of the project team. The development and design period was extended to six months due to the generous pre-verification, but the rework in the improved design was eliminated, and the time required to create the document was halved to 10 months, reducing the total by 8 months.

Effects of VPS use (3)



Murata Machinery・Inuyama plant is based on 3D data. Using VPS as a tool to connect departments, great results I've been raising it. In addition, as a new initiative, installation and we are also considering the use of 3D for maintenance and other operations.

Company Profile

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Business: Manufacturing and Sales of Logistics Systems, FA systems, Clean FA, Machining Tools, Metal Sheet Processing Machines, Textile Machinery, Information Equipment, etc.

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